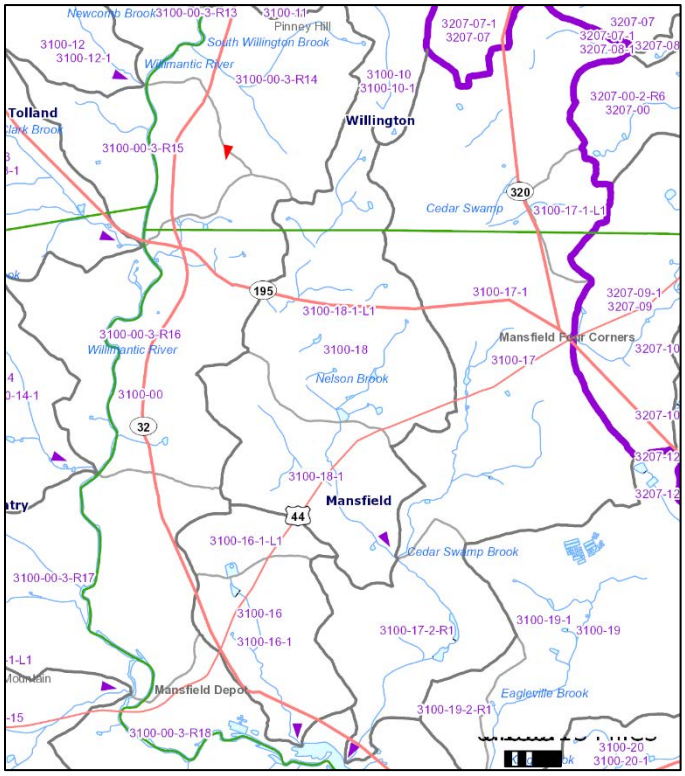
Protecting Cedar Swamp Brook Watershed

Mansfield, Connecticut



The Case for Watershed Land Use Planning

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Introduction

Cedar Swamp Brook Watershed is one of the last remaining watersheds that has the potential to provide additional potable water to the growing population of the town of Mansfield and its University population. This watershed represents 11% of Mansfield's land area and is located immediately to the west and northwest of the University of Connecticut. The University of Connecticut has not provided a net increase in student housing on campus for over twenty years despite a substantial growth in its student enrollment. The result has been increasing pressure to build privately owned student housing throughout the town – especially in the Cedar Swamp Brook watershed. This paper presents the case for watershed land use planning that can serve as a vehicle to protect this valuable potential public water supply before development pressures obviate its value.

The Case for protecting potential future water supplies

The State of Connecticut has faced several years of significant summertime drought conditions. Lack of water has been particularly severe in Mansfield, CT where tens of thousands of residents including University of Connecticut students have been forced to undertake extreme conservation measures to stay within the university's water allotments. Indeed, during the last ten years the problem became so severe that the University and the town petitioned for a water diversion permit to obtain additional water from the Shenipsit Lake Reservoir – a water resource outside of the watershed of the town of Mansfield. On May 29, 2015 the Connecticut DEEP approved the permit for this five mile water distribution system that authorized an average of 1.18 million gallons per day for the University of Connecticut. Construction of the system was completed in the fall of 2016.

Coincidentally, the Mansfield Planning and Zoning Commission placed a moratorium on new multi-family development effective September 12, 2016 with the objective of creating new regulations to better manage these types of water intensive developments. Unfortunately, the proposed draft regulations enable an enormous amount of multi-unit housing that could quickly consume all of the town's allocation under the diversion permit. If Mansfield's proposed draft multi-unit housing regulations are adopted as presented at their January 30, 2017 informal hearing, as much as 950,000 gallons of water per day could be consumed if all of the proposed zoning is developed to "build out" conditions.

Why is this proposed zoning change relevant to Mansfield residents? This potential demand for water to meet the needs for off-campus student housing was not factored into the approval of UCONN's water diversion permit nor in the Record of Decision issued by the University of Connecticut on July 30, 2013. That Record of Decision assumed that "off campus" water demand would not exceed 603,155 gallons per day in the fifty year buildout (i.e. year 2060). Clearly, the University and the town of Mansfield have grossly underestimated their potential water needs – a fact that has become apparent within less than 2 years of the permit approval!

Why are the Connecticut DEEP's diversion permit restrictions important to Mansfield? Clearly, the town of Mansfield will need to drawdown more water from the Shenipsit Lake Reservoir – a process that could be challenging in the future if that reservoir is unable to meet future town needs. In the interest of water security and avoidance of inter-basin water transfers, Mansfield and the University of Connecticut should protect other potential water supply sources that fall within their jurisdictions. Mansfield's water constraints underscore the need for two strategies – water conservation and improved watershed protection for the Cedar Swamp Brook watershed. In view of limited long term water supplies, Mansfield should focus on land use development that 1) is the least water intensive and 2) identifies potential surface and drinking water sources that could supplement its long term water needs. Fortunately Public Act 85-279 entitled "An Act Concerning the Protection of Public Water Supplies" requires municipal Planning and Zoning commissions to consider protection of existing and potential public surface water supplies in their plans and regulations. This enabling legislation has been used by some Connecticut Planning and Zoning Commissions to protect water resources independently of the statewide program for aquifer protection regulations. Currently eighty municipalities have been mandated to regulate existing drinking water aquifers serving 1,000 customers or more. However, only a handful of municipalities have complied with the state mandate for protection of *potential* water supplies. For a full explanation of the current aquifer protection regulatory program, see Appendix A of this report.

Protecting Cedar Swamp Brook Watershed

Zoning is one of the most relevant tools for implementing potential drinking water protections for the Cedar Swamp Brook watershed. This watershed contains approximately 3,320 acres with most of the land located in Mansfield and a small portion in Willington. Most of the land in this watershed is zoned for R-90 (residence) or RAR-90(rural agricultural residence) but a significant portion is allocated to the University's Institutional Zone (I) and its Research and Development Limited Industrial

Zone (RD/LI) and the town's Planned Business 3 zone (PB-3) at Four Corners. A handful of landowners own a majority of this watershed including the University of Connecticut (over 775 acres within the watershed) which owns a special 152 acre parcel previously used as the university's public water supply (i.e., the reservoir on Bone Mill Road).[1]

In 1980, the Mansfield Conservation Commission was concerned about the potential development impacts to this watershed and requested an Environmental Review Team (ERT) study be conducted of its natural resources. According to that study, in 1980 the 3,320 acres of watershed contained 1,316 acres of hardwoods, 128 acres of softwoods, 109 acres of softwoods and hardwoods, 779 acres of wetlands, 377 acres of agricultural and open fields, 479 acres of residential and commercial development and 20 acres of disturbed land. The ERT recommended that zoning regulations be used to protect forests, wetlands, and agricultural lands to minimize soil disturbance, improve stormwater management and restrict the types of land uses compatible with the potential future use of the watershed for drinking water.

Both the State Water Resource Center and the U.S. Geological Survey have identified Cedar Swamp Brook watershed as a significant water supply resource that merits protection. In 1967, the U.S. Geological Survey issued a report titled Hydrologic Data for the Shetucket River Basin which included important streamflow data for Cedar Swamp Brook. That study revealed that the 4.92 square mile Cedar Swamp Brook Basin discharged up 10.8 million gallons per day during peak flow periods in the spring and about 1.5 million gallons per day during low flow conditions.[2] The U.S. Geological Survey issued a companion report, titled Water Resources Inventory of Connecticut, Part 2, Shetucket River Basin which indicates that the Cedar Swamp Brook can be expected to equal or exceed 400,000 gallons per day 90% of the time. In addition, much of the Cedar Swamp Watershed is underlain with stratified drift aquifers that have very high yield potential above and beyond surface water resources (See Appendix B). While some of this water capacity would be required to maintain aquatic habitats and groundwater resources for those still relying on wells, this study suggests that Cedar Swamp Brook remains an invaluable potential water supply for Mansfield. While there has been some development within the watershed since the ERT study was

[1] The Connecticut State Legislature authorized this land for a University water supply on May 21, 1919. See, An Act Making Provision for a Water Supply for the Connecticut Agricultural College and the Mansfield State Training School and Hospital, Senate Bill Number 613. This water supply remained operational from 1920 to 1927.

[2] A subsequent study prepared by the Connecticut Environmental Protection's Water Resources Center determined the drainage area of the Cedar Swamp Watershed as 5.019 square miles. See page 3-5 of Gazetteer of Drainage Areas of Connecticut, Water Resources Bulletin Number 45, CTDEP, 1997. Accessed online at: http://cteco.uconn.edu/docs/wrb/wrb45_gazetteer_of_drainage_areas_of_connecticut.pdf

completed, it remains a high quality potential public water supply but only if immediate actions are taken to protect it.

The Environmental Review Team evaluation of Cedar Swamp Watershed identified strategies for protecting its natural resources which remain as relevant today as they were in 1980. The team made the following observations:

> The Cedar Swamp Brook watershed may have less future development potential than most areas of comparable size in eastern Connecticut. An unusually large percentage of this watershed area is occupied by wetlands. Development has already occurred in some of the most suitable sections of the watershed. The drainage area of Cedar Swamp Brook north of its confluence with Nelson Brook has been especially affected, with an apartment complex off Cisar Road in Willington, a housing development just to the south along Routes 32 and 195 in Mansfield, and two trailer parks along Route 44A in Mansfield.

The team also underscored the need for zoning restrictions along stream corridors in light of the adverse impacts from ongoing development. The team recommended the following approach which continues to be of great importance in controlling the destiny of the Cedar Swamp watershed.

> The current zoning that regulates development in the watershed is fairly typical of such a suburban area; that is, single family homes on minimum one-acre lots are permitted by right; apartments at a density of four units to the acre may be constructed after the issuance of a Special Permit. In addition, the subdivision regulations provide for dedication of open space whenever a parcel of land is divided into building lots.
>
> While perfectly reasonable under the conditions prevailing within the watershed, the zoning regulations will undoubtedly come under increasing strain as attempts are made to extract the maximum development potential out of smaller or marginal lots. Protection of valuable natural resources under such conditions becomes more difficult. Therefore protection of major streambelts and wetlands should be a high priority. Maximum flexibility should be incorporated in the land use regulations to insure that streambelt corridors, as identified by the Plan of Development and the Conservation Commission, are granted wide buffer protection. While maintaining the existing density standards, special provisions could be made for excluding significant areas of wetland from calculation of lot size, thereby minimizing the negative impact on wetlands when too many acre lots are attempted in areas where wetlands are a substantial portion of the land. Flexibility in yard requirements and actual lot sizes through various cluster zoning techniques would permit development of additional land without unreasonable destruction of wetlands and other natural features.

The ERT recommended that Mansfield make an effort to preserve substantial portions of the watershed through an assertive program of acquisition of sites and preservation of critical water bodies, cultural, historic, scenic and natural areas including lakes, ponds, marshes, streams, hilltops offering scenic vistas and historic home sites. Specific examples recommended by the ERT included the lower portion of Cedar Swamp Brook, the hilltops and

swamp areas all of which were identified in the 1980 ERT report. The team also recommended preservation of important aquifers and wetlands for continued water supply and flood water storage capacity.

Currently, several important parcels within the watershed are owned by the University of Connecticut. However, development pressures from the University and Mansfield threaten the long term quality of this water resource if land use controls are not implemented soon. For example, a privately owned 45.9 acre parcel that was recently proposed for development but withdrawn, falls partly within the Cedar Swamp Brook Watershed and could have significant adverse impacts to its potential future water supply use. Indeed, the Mansfield Planning and Zoning Commission's proposed draft multi-unit housing regulations could further degrade the potential use of this watershed for public water use if efforts are not made to modify some of the density levels and density bonuses proposed by the Commission's Regulatory Review Committee for the Hunting Lodge Road area.

A Five Point Action Plan

What needs to be done to protect the Cedar Swamp Watershed? There are five key initiatives that need to be considered by the town of Mansfield and the University of Connecticut as follows:

1. Develop land use controls for the Cedar Swamp Brook Watershed: Section 8-2 of the Connecticut General Statutes authorize planning and zoning commissions to protect potential surface and groundwater drinking supplies. Indeed, Section 8-2 is not discretionary. The statute states the zoning regulations, shall be made with reasonable consideration for the protection of existing and *potential public surface and ground drinking water supplies. (emphasis added).* Mansfield has the opportunity to play a leadership role in protecting future potential water resources by developing an overlay zone that would create protections such as advanced stormwater management controls, hazardous chemical prohibitions, underground storage tank prohibitions, advanced control technologies for fuel storage, reduced lot coverage and impermeable cover standards within the watershed.

2. Limit Future use of land owned by the State within the Watershed: Since the University of Connecticut owns a significant amount of land within the Cedar Swamp Book watershed, the University and the town of Mansfield should establish deed restrictions, irrevocable land trusts or state legislation that would protect this land for future water supply

purposes. Legislation to restrict future use of University of Connecticut land within the watershed should be a high priority.[3]

3. Complete an Inventory of the Natural Resources within the Watershed: The Cedar Swamp Brook watershed has valuable wetland resources and affords an important habitat for terrestrial and aquatic species that survive only when the watershed is kept free of pollution and without degradation of the functional values offered by the brook's wetlands and watershed. The town of Mansfield, working with the University of Connecticut's Center for Land Use Education and Research (**CLEAR**) could play an instrumental role in completing an on-site inventory of these natural resources and identifying techniques for reducing impervious cover within the watershed. Specifically, it would be ideal if the staff of CLEAR could be funded to complete a watershed inventory for Cedar Swamp Brook following the model established for the adjacent Eagleville Brook. According to a 2006 CLEAR analysis of riparian corridors in Mansfield, a total of 11.4% of all land in Mansfield falls within 100 feet of a riparian corridor. Land falling in that 100 foot zone has been converted into developed land at a relatively fast pace with 55 acres lost between 1985 and 2006. It is assumed that these types of land conversions apply equally to Cedar Swamp Brook watershed as well as to the rest of Mansfield. Clearly, this points to the need to develop a precise inventory of the natural resources along the Cedar Swamp Brook including forest and grass cover, wetlands and agricultural land. Loss of these vital natural resources is the first step toward the loss of this potentially irreplaceable watershed in Mansfield. In the fall of 2016, Professor John Silander provided eloquent testimony on the need to protect this watershed at a recent public hearing for a development along Hunting Lodge Road. His testimony underscores the need for municipal conservation efforts for this watershed.

4. Consider Transfer of Development Rights for Land Uses that Adversely Impact Watershed Resources: Section 8-2 of the Connecticut General Statutes authorize zoning commissions to provide for a municipal system for the creation of development rights and the permanent transfer of such development rights, which may include a system for the variance of density limits in connection with any such transfer. Using this approach, the town of Mansfield or a private foundation could buy the development rights of certain properties that might be

[3] It is relevant to note that the CT DEEP's Comprehensive Open Space Acquisition Strategy: 2016-2020 Green Plan recommends over the next five years that DEEP work with "land conservation and other partners to identify and build additional key spatial datasets that enable the state to evaluate and prioritize the acquisition of lands having critical environmental and recreational resources" including "inactive drinking water reservoirs".

adversely affected by watershed based land use restrictions within Cedar Swamp Brook watershed. Taking this approach, a developer could transfer his development rights to another property within Mansfield and/or the University of Connecticut if all the affected parties could agree on the value of such development rights and the appropriate location where density transfers would be allocated. Alternatively, the town, the University, or a private foundation working on behalf of the university or town could simply purchase these development rights as a philanthropic initiative with possible tax benefits as well. This option, the transfer of development rights, while more complicated than simply limiting the density of development, would be necessary if the land use restrictions required to protect the watershed resulted in a potential taking of property. More information on this strategy is available from Cornell University.

5. Ongoing Monitoring of the UCONN Hazardous Chemical Pit Remediation: Due to the proximity of UCONN's hazardous chemical pit to the Cedar Swamp Brook, the University and Mansfield will need to pay special attention to the 30 year ongoing monitoring and remediation work associated with the chemical pit to ensure there are no land use activities that might influence the groundwater flows from that pit toward the Cedar Swamp Brook. While the University of Connecticut received permission to discontinue quarterly reporting on the remediation in 2009, it is critical that Mansfield remain aware of this ongoing serious threat to the highly significant potential future water supply within the Cedar Swamp Brook watershed. For this reason, it is highly recommended that multi-family housing not be developed along Hunting Lodge Road in the near term since such development could adversely influence ground and sub-surficial water pathways that could have consequences for Cedar Swamp Brook. At present, there appear to be no threats to the brook from the chemical pit but this should not relieve the town or the University of Connecticut from ongoing monitoring to protect downgradient natural resources and potential future water supplies for the town. Currently, with the exception of the chemical pit, which is classified as GB or unfit for potable water, the remainder of the Cedar Swamp Brook watershed is classified as GA, indicating it is suitable for drinking without treatment including its base flow for hydraulically connected surface water bodies (See Appendix C). However, despite its GA classification the Cedar Swamp Brook is affected by ongoing development pressures which have resulted in elevated e-coli levels in limited portions of the brook.[4] These

[4] See Willimantic River Watershed Summary, Willimantic River, Eagleville Brook and Cedar Swamp Brook, September 2012, pgs. 26 & 38.

development pressures underscore the need for immediate monitoring and corrective action strategies.

Conclusion

The Town of Mansfield has a unique opportunity to protect the 5.019 square miles of the Cedar Swamp Brook watershed by using a variety of newly established zoning powers enabled by the Section 8-2 of the Connecticut General Statutes. This watershed is facing ongoing development pressures from the lack of on-campus student housing which could adversely affect the long term viability of this potential public water supply. A Five Point Plan to protect the watershed should include 1) the development of a watershed overlay zone, 2) the passage of legislation to protect watershed land owned by the University of Connecticut for future water use, 3) a detailed natural resource inventory of the watershed to determine priority land use controls, 4) development of zoning regulations to enable the transfer of development rights to more suitable locations within Mansfield and 5) ongoing monitoring of the UCONN chemical pit remediation and monitoring program to ensure it does not adversely affect this critical potential public water supply watershed.

Appendix A: Role of Municipal Zoning for Protecting Actual and Potential Water Supplies

Connecticut's zoning enabling statute requires zoning commissions to address the protection of actual and potential public surface and ground drinking water supplies. Section 8-2 of the Connecticut enabling legislation for zoning states:

"Zoning regulations may be made with reasonable consideration for the protection of historic factors and shall be made with reasonable consideration for the protection of existing and *potential public surface and ground drinking water supplies." (emphasis added).*

Public Act 85-279 entitled "An Act Concerning the Protection of Public Water Supplies" required, rather than allowed, municipal Planning and Zoning commissions to consider protection of existing and potential public surface water supplies in their plans and regulations. While the State of Connecticut has a very robust regulatory program for identified public water supply aquifers with a very specific role for municipalities, DEEP and water companies, there are no municipal programs that focus on potential public or surface water drinking supplies. Before addressing this major regulatory gap at the municipal level, it is important to understand the current regulatory domains of municipalities, DEEP and water companies.

Aquifer Protection Area Program Basics

Connecticut's Aquifer Protection Area Program protects major public water supply wells in sand and gravel aquifers to ensure a plentiful supply of public drinking water for present and future generations. Aquifer Protection Areas (sometimes referred to as "wellhead protection areas") are being designated around the state's 127 active well fields in 80 Towns in sand and gravel aquifers that serve more than 1000 people. Land use regulations will be established in those areas to minimize the potential for contamination of the well field. The regulations restrict development of certain new land use activities that use, store, handle or dispose of hazardous materials and requires existing regulated land uses to register and follow best management practices.

The Aquifer Protection Area Program responsibilities are shared by the state DEEP, the municipalities and the water companies.

Role of Connecticut DEEP: DEEP is responsible for overall program administration, establishing state land use regulations and standards, approving aquifer protection area maps and local regulations, and developing guidance materials. In addition to program administration, DEEP:

- assists municipal aquifer protection agencies with implementation
- provides training for the local officials and aquifer protection agency members
- directly regulates major facilities, state facilities and public service companies (utilities) located within the aquifer protection areas
- educates the public about ground water protection.

Role of Municipal Zoning for Identified Water Supplies: Municipalities in the program play the most critical role. They are responsible for appointing an aquifer protection agency, inventorying land uses within the aquifer protection area, designating the aquifer protection area boundary, and adopting and implementing local land use regulations. The agency regulates land use activities within the aquifer protection area by:

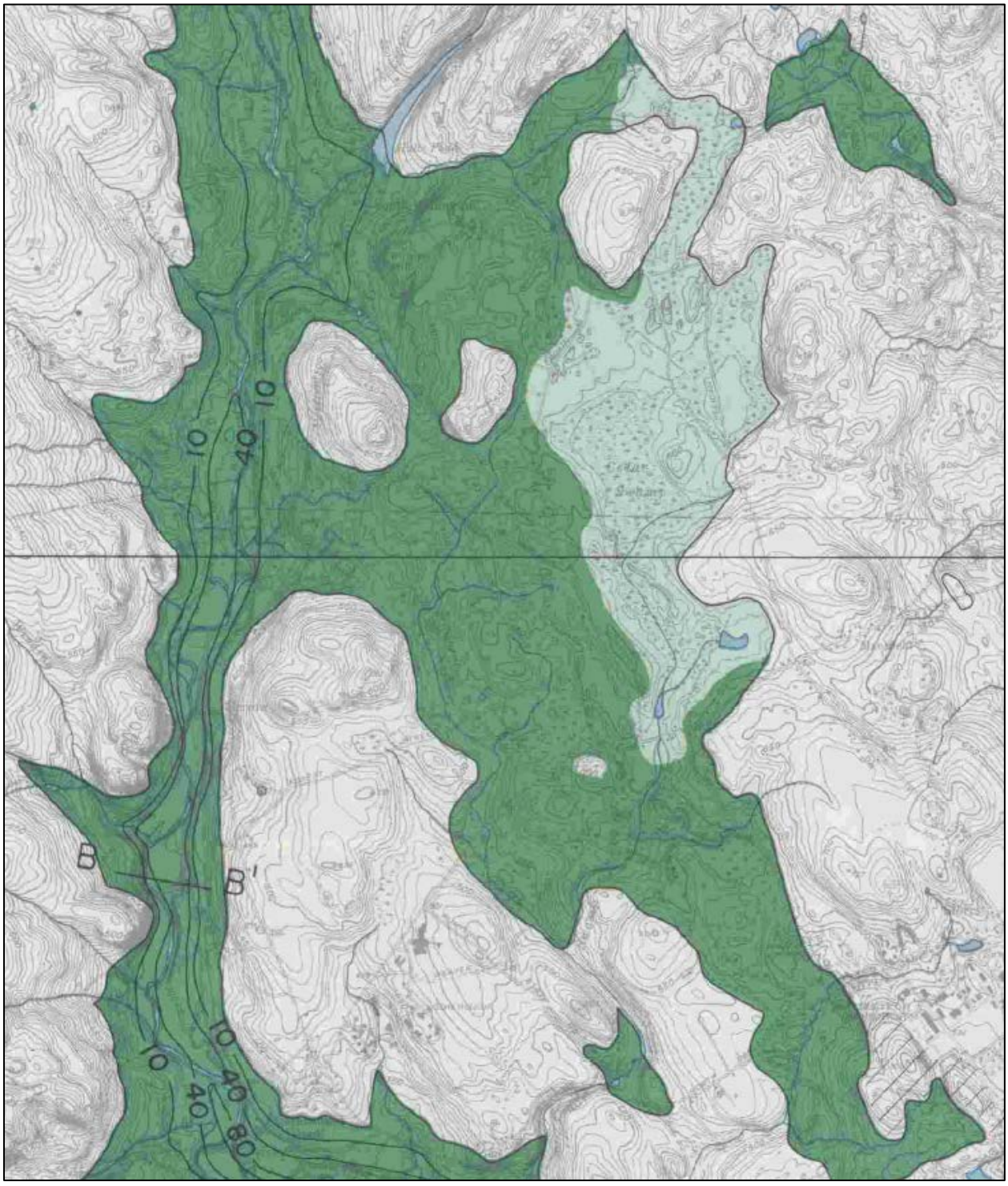
- registering existing regulated activities
- issuing permits for new regulated activities
- overseeing regulated facilities
- educating their citizens on ground water protection.

Role of Water companies: Water companies are required to map, using methods specified in state mapping regulations, the critical recharge areas of the aquifer which provide water to the well fields. The preliminary (Level B) mapping has been completed for all the well fields, providing a general estimate of the critical areas. This preliminary mapping is refined by the water companies using extensive, site-specific data and ground-water modeling to determine the final (Level A) mapping area. The final mapping defines the regulatory boundaries for the land use regulations. In addition to mapping, the water companies:

- assist towns with their protection programs and oversight of the aquifer protection area
- conduct well field monitoring to warn of contamination
- plan for land acquisition and protection around well fields.

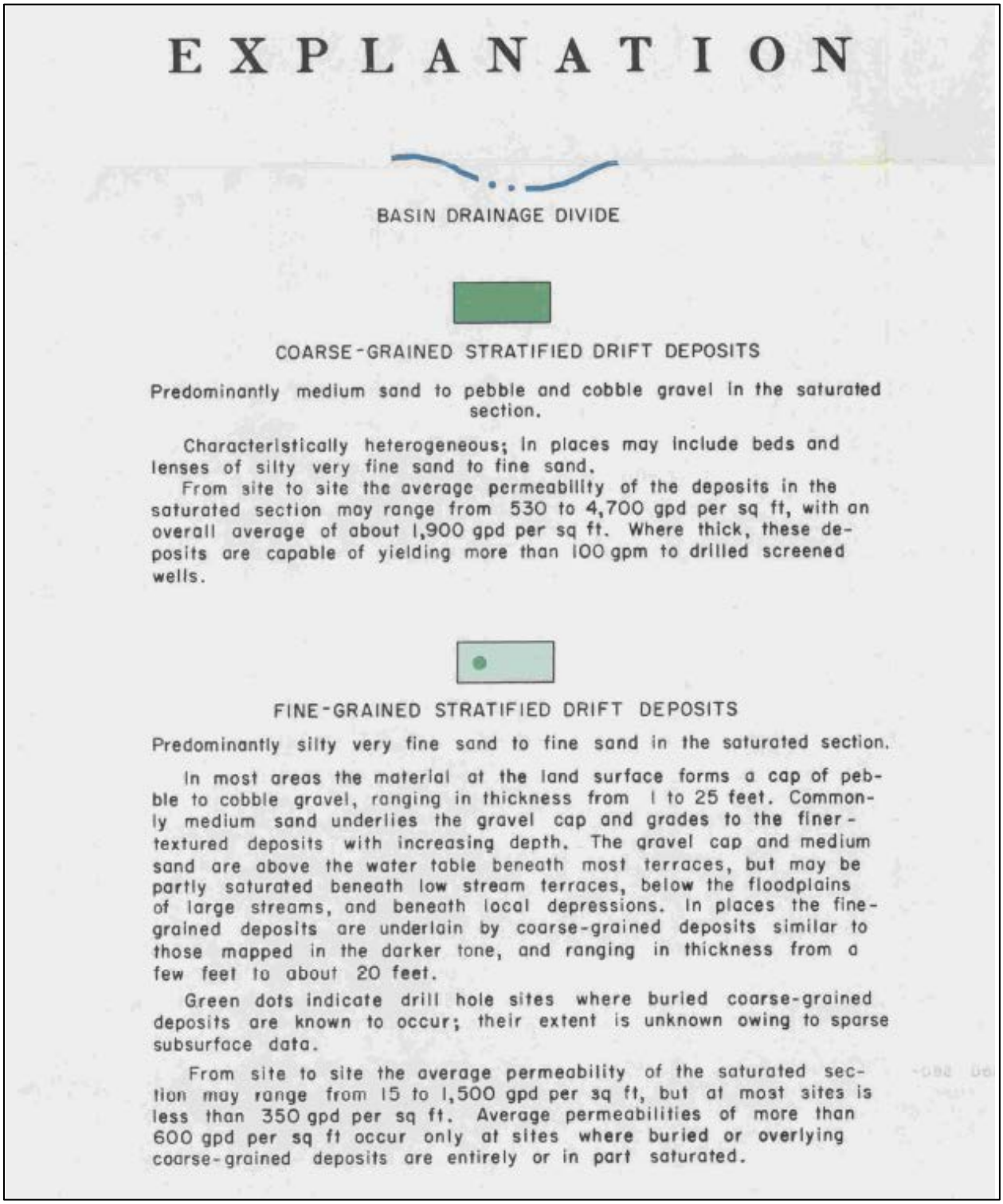
Source: Connecticut Department of Energy and Environmental Protection

Appendix B: Geo-hydrologic Map of the Cedar Swamp Watershed

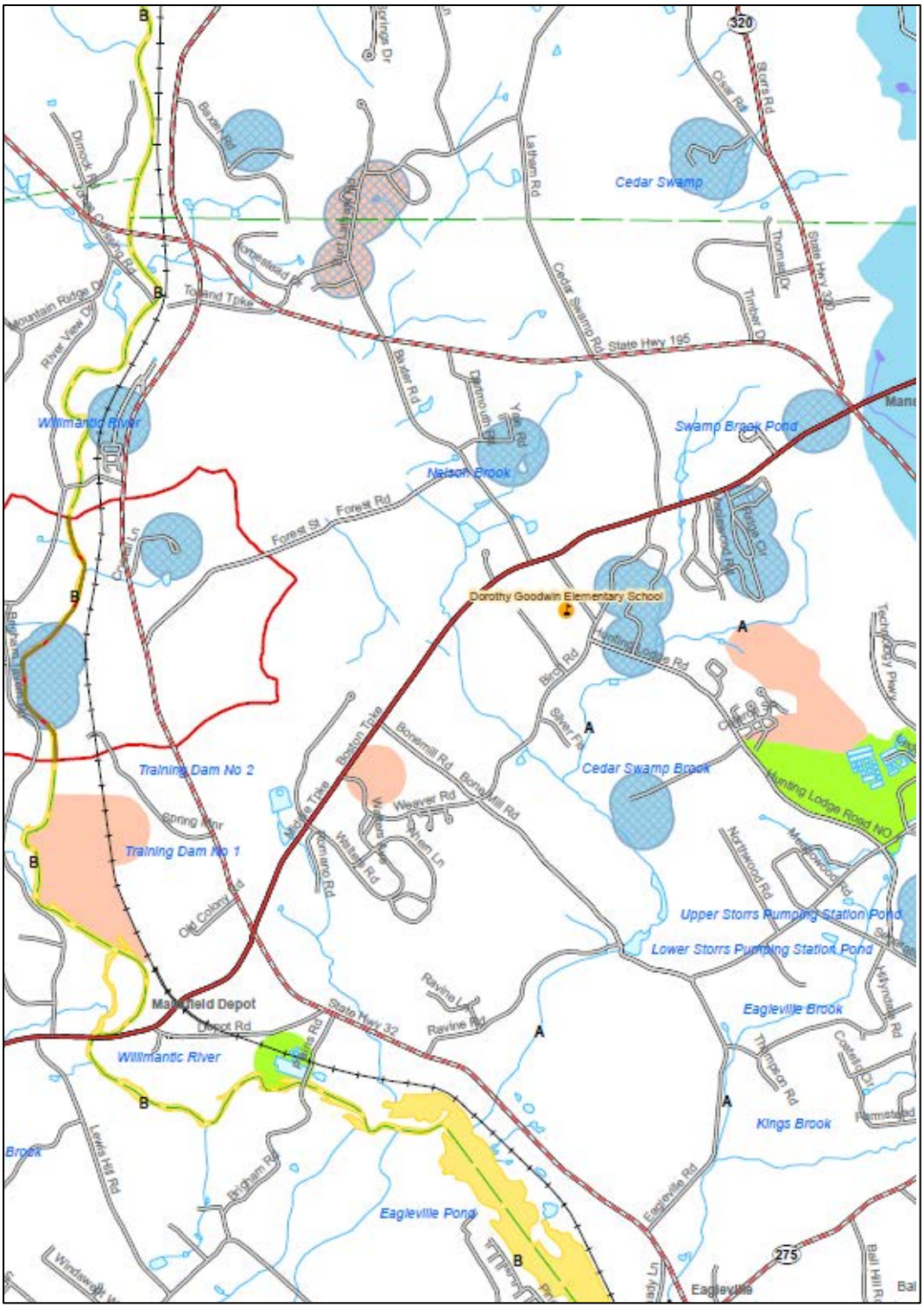


Source: Geo-Hydrologic Map of the Shetucket River Basin, U.S. Geological Survey, Connecticut Water Resources Bulletin Number 11, Plate B, 1967

Appendix B (continued): Explanation of Symbols Used on the Geo-Hydrologic Map of the Cedar Swamp Watershed

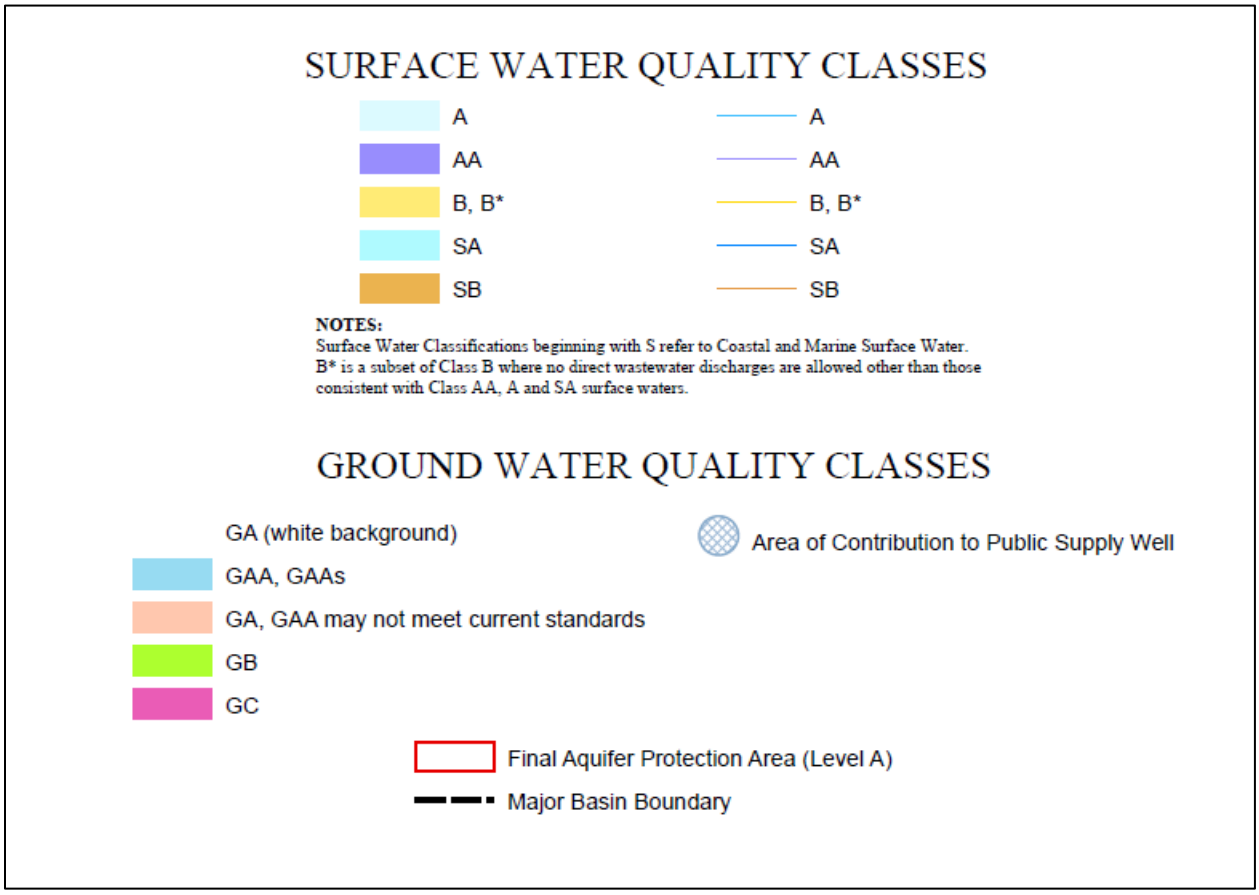


Appendix C: Water Quality Classification of Cedar Swamp Watershed (from Mansfield Water Quality Classification Map)



Source: Water Quality Classification, Mansfield, CT, 2011

Appendix C (continued): Explanation of Symbols Used on the Groundwater Classification Map



Note: Class GA designated uses (i.e., areas on the map shown in white) are existing private and potential public or private water supplies of water suitable for drinking without treatment and base flow for hydraulically connected surface water bodies. As can be seen on the map, most of the Cedar Swamp Watershed falls within a GA classification. The only exceptions are those locations with existing areas with a contribution to a public water well (i.e. blue areas with cross hatching) or the UCONN former landfill (i.e., the GB classification shown in green on the edge of the watershed).

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